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COMMITTEE ON THE PEACEFUL USES
OF OUTER SPACE

COORDINATION OF OUTER SPACE ACTIVITIES WITHIN THE UNITED NATIONS SYSTEM: PROGRAMMES OF WORK FOR 1992 AND 1993 AND FUTURE YEARS

Report of the Secretary-General

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INTRODUCTORY NOTE

The present report has been prepared by the Secretary-General at the request of the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space and concerns efforts at coordinating the activities of organizations within the United Nations system that relate to assistance to developing countries in the practical application of space technology.*

The report is based on the contributions submitted by the organizations concerned in response to the United Nations request for information on concrete programmes of work envisaged primarily for 1992 and 1993 and was reviewed in its draft form at the Inter-Agency Meeting on Outer Space Activities, held at the headquarters of the United Nations Disaster Relief Coordinator (UNDRO), at Geneva, from 18 to 20 September 1991.

The report consists of two sections: section I presents a summary of major activities and programmes planned for 1992 and 1993 and future years by the organizations within the United Nations system as a whole; section II presents concrete activities or programmes planned by individual organizations in an integrated form under substantive headings - remote sensing, communications, meteorology, hydrology, space science, use of space technology for maritime communications and for air navigation and other activities in the field of space science and technology and its applications - rather than under organizations by which they are conducted. At the same time, in order to help the reader to identify the activities of each organization in specific fields, a matrix of outer space programmes, a list of acronyms as well as a list of organizations participating in outer space activities are provided.

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* This is the seventeenth such annual report. The first 16 reports were contained in documents A/AC.105/166, 183, 201, 223, 242 and 278, A/CONF.101/BP.11/Add.1, A/AC.105/309 and Corr.1, A/AC.105/325, 342, 359, 373, 389, 415, 444 and Corr.1, and 465.

LIST OF ORGANIZATIONS PARTICIPATING IN OUTER SPACE ACTIVITIES

A. United Nations

Outer Space Affairs Division (OSAD)

Remote sensing - paragraphs 13 (a-g, u), 37 (a-c), 44, 88, 91, 105, 106

Communications - paragraphs 107, 108, 112, 113 (a-b), 116

Meteorology and hydrology - paragraphs 132, 133, 134 (a), 137, 138

Basic space science - paragraphs 162, 163, 164

Other activities in the field of space science and technology and its applications - paragraphs 173-176

International Space Year - paragraphs 178-180, 183-185

Office of Legal Affairs (OLA)

Communications - paragraph 127

Other activities in the field of space science and technology and its applications - paragraph 177

Natural Resources and Energy Division (NRED) of the Department of Technical Cooperation for Development (DTCD)

Remote sensing - paragraphs 32, 38, 53

Office of the United Nations Disaster Relief Coordinator (UNDRO)

Remote sensing - paragraph 90

Communications - paragraphs 110, 111, 122

United Nations Environment Programme (UNEP)

Remote sensing - paragraphs 17-20, 34-36, 51, 58-63, 67-72, 81, 95-98, 104

Communications - paragraph 125

Meteorology - paragraphs 135, 147, 148, 160

United Nations Institute for Training and Research (UNITAR)

Remote sensing - paragraphs 18, 33-36

Economic Commission for Africa (ECA)

Remote sensing - paragraphs 21-30, 40, 45, 82-86, 93, 94

Communications - paragraphs 115, 121

Meteorology - paragraphs 135, 140

Basic space science - paragraph 163

Other activities in the field of space science and technology and its applications - paragraph 176

Economic and Social Commission for Asia and the Pacific (ESCAP)

Remote sensing - paragraphs 13 (o-x), 14-16, 41-43, 55, 92

B. Specialized agencies

Food and Agriculture Organization of the United Nations (FAO)

Remote sensing - paragraphs 13 (d, h-n), 27, 46-50, 56, 57, 64-66, 78-80, 87, 99, 100, 102, 103 (a-d)

Communications - paragraph 119

Meteorology - paragraphs 132, 133, 135

United Nations Educational, Scientific and Cultural Organization (UNESCO)

Remote sensing - paragraphs 39 (a-f), 73-75

Communications - paragraph 118 (a-f)

Meteorology - paragraphs 158, 159

Basic space science - paragraph 165

International Space Year - paragraphs 181, 185

International Civil Aviation Organization (ICAO)

Communications - paragraph 130

Land, maritime and aeronautical mobile services - paragraph 172

World Health Organization (WHO)

Remote sensing - paragraphs 31, 76, 77

Communications - paragraphs 109, 120, 126

Land, maritime and aeronautical mobile services - paragraph 168

International Space Year - paragraph 182

International Telecommunication Union (ITU)

Remote sensing - paragraph 89

Communications - paragraphs 104 (a-l), 114 (a-c), 117, 123 (a-h), 124, 128, 129

Meteorology - paragraph 161

Land, maritime and aeronautical mobile services - paragraph 171

World Meteorological Organization (WMO)

Remote sensing - paragraphs 31, 75, 101

Meteorology - paragraphs 132 (a-b), 134 (a-c), 135, 136, 139 (a-f), 140-144, 145 (a-d), 146, 148, 149-157

Land, maritime and aeronautical mobile services - paragraph 167

Other activities in the field of space science and technology and its applications - paragraph 175

International Space Year - paragraph 185

International Maritime Organization (IMO)

Land, maritime and aeronautical mobile services - paragraphs 166, 167, 169, 170

World Intellectual Property Organization (WIPO)

Communications - paragraphs 118 (c), 131

International Bank for Reconstruction and Development (World Bank)

Remote sensing - paragraph 52

MATRIX OF OUTER SPACE PROGRAMMES*

	Remote sensing	Communications	Meteorology and hydrology	Space science	Mobile services	Other applications	ISY
OSAD	13 (a-g, u), 37 (a-c), 44, 88, 91, 105, 106	107, 108, 112, 113 (a-b), 116	132, 133, 134 (a), 137, 138	162, 163, 164		173-176	178-180, 183-185
OLA		127				177	
NRED/ DTCD	32, 38, 53						
UNDRO	90	110, 111, 122					
UNEP	17-20, 34-36, 51, 58-63, 67-72, 81, 95-98, 104	125	135, 147, 148, 160				
UNITAR	18, 33-36						
ECA	21-30, 40, 45, 82-86, 93, 94	115, 121	135, 140	163		176	
ESCAP	13 (o-x), 14-16, 41-43, 55, 92						
FAO	13 (d, h-n), 27, 46-50, 56, 57, 64-66, 78-80, 87, 99, 100, 102, 103 (a-d)	119	132, 133, 135				
UNESCO	39 (a-f), 73-75	118 (a-f)	158, 159	165			181, 185
ICAO		130			172		
WHO	31, 76, 77	109, 120, 126			168		182
ITU	89	104 (a-l), 114 (a-c), 117, 123 (a-h), 124, 128, 129	161		171		
WMO	31, 75, 101		132 (a-b), 134 (a-c), 135, 136, 139 (a-f), 140-144, 145 (a-d), 146, 148, 149-157		167	175	185
IMO					166, 167, 169, 170		
WIPO		118 (c), 131					
World Bank	52						

* The numbers in each column designate paragraphs.

ACRONYMS

AARS	Asian Association for Remote Sensing
ACMAD	African Centre of Meteorological Applications for Development
AOCRS	African Organization of Cartography and Remote Sensing (ECA)
ARABSAT	Arab Satellite Communications Organization
ARTEMIS	Africa Real Time Environmental Monitoring Information System
AVHRR	Advanced very high resolution radiometer
CAS	Commission for Atmospheric Sciences
CCIR	International Radio Consultative Committee (ITU)
CCITT	International Telegraph and Telephone Consultative Committee (ITU)
CILSS	Permanent Interstate Committee for Drought Control in the Sahel
CNS	Communication navigation and surveillance
COSPAR	Committee on Space Research (ICSU)
CRTO	Regional Centre for Remote Sensing at Ouagadougou (ECA)
CTD	Control of Tropical Disease (WHO)
DCP	Data collection platform
DIANA	Data and Information Available Now in Africa
ECLAC	Economic Commission for Latin America and the Caribbean
EEC	European Economic Community
ESA	European Space Agency
FANS	Future Air Navigation System
FAORSC	FAO Remote Sensing Centre
GARS	Geological Applications of Remote Sensing
GAW	Global Atmosphere Watch (WMO)
GEMS	Global Environmental Monitoring System
GIEWS	Global Information and Early Warning System on Food Security (FAO)
GIS	Geographic Information System
GLASOD	Global Assessment of Soil Degradation
GLONASS	Global Orbital Navigation Satellite System (USSR)
GMDSS	Global Maritime Distress and Safety System (IMO)
GO_3OS	Global Ozone Observing System
GPS	Global Positioning System (United States of America)
GRID	Global Resource Information Data base

GTS	Global Telecommunication System
HRSD	High-resolution satellite data
HRV	High Resolution Visible (SPOT satellite)
IACC	Inter-Agency Consultative Committee
IAMAP	International Association of Meteorology and Atmospheric Physics
ICPIC	International Cleaner Production Information Clearinghouse (UNEP)
ICSU	International Council of Scientific Unions
IFRB	International Frequency Registration Board (ITU)
IGADD	Intergovernmental Authority on Drought and Development
IGOSS	Integrated Global Ocean Station System (UNESCO/WMO)
IHO	International Hydrographic Organization
IHP	International Hydrological Programme
ILEC	International Lake Environment Committee
ILRAD	International Laboratory for Research on Animal Diseases
INFOTERRA	International Referral System for Courses of Environmental Information (UNEP)
IOC	Intergovernmental Oceanographic Commission (UNESCO)
IOMAC	Indian Ocean Marine Affairs Cooperation
ISCCP	International Satellite Cloud Climatology Project
ISLSCP	International Satellite Land-Surface Climatology Project
ISPRA	European Community Joint Research Centre
ISRIC	International Soil Reference and Information Centre
ISSS	International Soil Survey Society
ISY	International Space Year
ITC	International Institute for Aerospace Survey and Earth Sciences (Netherlands)
IUCN	World Conservation Union
IUGS	International Union of Geological Sciences
LRSD	Low-resolution satellite data
MARC	Monitoring and Assessment Research Centre (UNEP)
MSS	Multispectral scanning
NASA	National Aeronautics and Space Administration (United States)
NOAA	National Oceanic and Atmospheric Administration (United States)
RASCOM	Regional African Satellite Communications System

RCSSMRS	Regional Centre for Services in Surveying, Mapping and Remote Sensing (ECA)
RECTAS	Regional Centre for Training in Aerospace and Surveys (ECA)
RIS	Regional Information Service (ESCAP/UNDP/RRSP)
RRSP	Regional Remote Sensing Programme (ESCAP/UNDP)
SADCC	Southern African Development Coordination Conference
SAR	Synthetic Aperture Radar
SPOT	Experimental Earth Observation Satellite (France)
STIBOKA	Dutch Soil Survey Institute
TM	Thematic Mapper (Landsat satellite)
TREDMAR	Training and Education in Marine Science (UNESCO)
UNISPACE 82	Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space
WCRP	World Climate Research Programme
WGI	World Glacier Inventory
WWW	World Weather Watch (WMO)

Section I

SUMMARY OF MAJOR ACTIVITIES AND PROGRAMMES PLANNED FOR 1992 AND 1993 AND FUTURE YEARS

1. The organizations within the United Nations system have planned activities for 1992 and 1993 and future years within the categories of remote sensing, communications, meteorology and hydrology. Organizations within the United Nations system will also conduct valuable outer space-related or -aided activities in basic space sciences and in land, maritime and aeronautical communications and other activities related to space science and technology and its applications. The planned activities generally range from education and training programmes, through fellowships, training workshops and summer schools, to expert services and survey missions to identify specific areas of applications relevant to a given country or group of countries and to carry out relevant studies or pilot projects as well as to disseminate information on the status of technology. Also, organizations within the United Nations system are preparing regional feasibility studies and designing education training programmes in remote sensing and satellite communications to establish indigenous capabilities in developing countries. In addition, there are other ongoing activities relating to the regulation and utilization of space activities.

2. In the area of remote sensing, the United Nations and its specialized agencies have planned a number of international, regional and national training courses and workshops. They cover remote-sensing applications in general as well as specialized topics such as the use of high-resolution satellite imagery in agricultural, fisheries and forestry applications, the use of low-resolution imagery from environmental satellites for early warning on agricultural crop production and desert locust activity forecasting in Africa, the Near East and South-West Asia by the upgraded ARTEMIS system, the use of infrared and radar systems in assessing and managing natural resources and the handling and management of georeferenced monitored data through the Global Resource Information Data base (GRID) of the Global Environmental Monitoring System (GEMS) as an aid to the development of natural resource surveying and mapping systems. Most of these international and regional training courses are jointly organized by two to four organizations within the United Nations system, often in cooperation with other international organizations and/or Governments. National courses on remote-sensing applications are also planned in a number of developing countries. Fellowships in the area of remote sensing will also be offered in the 1992-1993 period by a number of international organizations and Member States.

3. Many of the organizations of the United Nations will offer expert services in their respective areas of competence. A number of pilot projects relying on remote-sensing applications include forest resource assessment, desertification control, vegetation monitoring, natural disaster forecasting and assessment of their impact on geological mapping and mineral exploration, land use and natural hazards monitoring. Also, special projects are being

carried out in marine pollution, vegetation monitoring and irrigation management. In the area of dissemination of information on remote-sensing technology, organizations either provide information upon request or issue newsletters and technical publications on regional or sectoral development of remote-sensing capabilities.

4. Regarding communications, a number of projects, training courses, workshops and seminars are planned in such areas as applications of satellite technology to rural communication and use of communications systems to support primary health care, as well as search-and-rescue missions and disaster relief operations. Fellowships in the field of communications are also offered through the United Nations system with the cooperation of the agencies of Member States.

5. Various expert and technical advisory services are offered in the planning of global and regional satellite communications systems as well as Earth station projects and satellite communications, navigation and surveillance for international civil aviation. FAO, in cooperation with the satellite communications system DIANA, linking FAO headquarters through microcomputer-based terminals with its Regional Office for Africa in Accra, Ghana; the Regional Centre for Services in Surveying, Mapping and Remote Sensing (RCSSMRS) in Nairobi, Kenya; and the Department of Meteorological Services in Harare, Zimbabwe. Regional study projects for establishing satellite communications networks are being carried out; one of particular importance is being carried out in the Regional African Satellite Communications System (RASCOM). The RASCOM feasibility study was completed and a dedicated satellite system, operated by a new organization, will be implemented. In addition, the legal and regulatory aspects of the frequency spectrum for space communications will be considered. Furthermore, the organs concerned will disseminate information on services and studies and hold conferences to inform the Member States thereon.

6. A series of workshops and seminars is planned for 1992 and 1993 on various aspects of satellite meteorology and its applications. A number of technical cooperation activities in meteorology and operational hydrology are planned in Member States. In addition, activities on the use of space technology in the evaluation and management of marine resources, particularly on the Atlantic coast of Africa and in the Indian Ocean region, are being developed.

7. In sectors of development that depend on the application of meteorology and agrometeorology, organizations within the United Nations system, including ECA, FAO, UNEP and WMO, plan courses, workshops and training courses in selected African countries. The World Weather Watch (WWW) increasingly uses satellite technology not only for obtaining meteorological information through remote-sensing techniques but also for communications. The application of satellite technology forms an important element of technical cooperation activities in both meteorology and hydrology. An example of this is the use of satellite techniques in the tropical cyclone programme. Under the World Climate Programme, various climate monitoring activities will be undertaken

involving the use of satellite data. A series of technical reports and publications on activities in areas such as ozone depletion will be made available.

8. In basic space sciences, the United Nations has planned a workshop to benefit ESCAP member States. Also, a series of fellowships in space research, of a duration of one to three years, will be offered. The United Nations, through its Programme on Space Applications, will continue to collaborate with the Committee on Space Research (COSPAR) to support the space research activities of scientists from developing countries.

9. The work of the specialized agencies of the United Nations is also making significant contributions in new areas of applications of space technology for land, maritime and aeronautical mobile communications. For disaster management, the use of the satellite transceiver for prompt response is being assessed. Further progress is being made towards the development of the future global maritime distress and safety system (GMDSS), aiming at its introduction in stages beginning in the early 1990s, and ships will be encouraged to include satellite equipment for its uses. Another example is the application of satellites for the early identification of areas of agricultural drought and desert locust infestation.

10. In the use of mobile satellite services in air navigation, further progress is being made towards establishing air-ground data links for use by air traffic services.

11. The organizations within the United Nations system are also actively involved in promoting education through distance learning and the development of skills at the local level in the field of space science and technology and its applications and centres for education training. These activities will be particularly emphasized during the 1992-1993 period, as part of International Space Year (ISY) and in furtherance of General Assembly resolution 44/46 of 8 December 1989, in which the Assembly endorsed the initiative of international scientific organizations and bodies to designate 1992 as International Space Year.

12. The Legal Subcommittee of the United Nations Committee on the Peaceful Uses of Outer Space will continue to elaborate draft principles related to nuclear power sources in outer space, to consider matters relating to the definition of outer space and to the geostationary orbit and to consider legal aspects of the sharing of the benefits of the exploration and utilization of outer space, taking into account the needs of the developing countries.

Section II

ACTIVITIES PLANNED BY THE ORGANIZATIONS WITHIN THE UNITED NATIONS SYSTEM FOR 1992 AND 1993 AND FUTURE YEARS

A. REMOTE SENSING

1. Education and training programmes

Training courses/workshops/seminars

13. The following training courses/workshops/seminars are being planned by the organizations within the United Nations system in 1992 and 1993:

(a) United Nations/United States International Conference on Satellite Remote Sensing for Resource Management, Environment Assessment and Global Change Studies: Needs and Applications in the Developing World, Boulder, Colorado, August 1992;

(b) Seventh United Nations/FAO/WMO/ESA Training Course on Microwave Remote Sensing for Africa, 1992;

(c) Second United Nations/Sweden Training Course on Remote Sensing Education for Educators, to be held at Stockholm and Kiruna in cooperation with the Government of Sweden, 1992;

(d) United Nations/FAO International Training Course for Theoretical Physics (ICTP) Training Course on Remote Sensing Applications, Rome, September/October 1992;

(e) United Nations/International Society for Photogrammetry and Remote Sensing (ISPRS) Workshop on Data Analysis Methods and Applications, to be held during the XVIIth ISPRS Congress, Washington, August 1992;

(f) United Nations/IAF/COSPAR Workshop on Space Technology for Development - Making It Happen, Washington, 28-30 August 1992, in association with the World Space Congress;

(g) United Nations Workshop on Remote Sensing, organized in cooperation with the Government of Japan, Ecuador, 13 March 1992;

(h) FAO/German Foundation for International Development (DSE) regional training course on forestry remote sensing and GIS applications in cooperation with the Governments of Germany and Malaysia, 1992;

(i) FAO/DSE regional training course on remote sensing and GIS applications to forestry, Munich, Germany, 1992;

(j) FAO/University of Reading, Meteosat rainfall estimation calibration workshop for IGADD and SADCC regions, Nairobi, May 1992;

(k) FAO/International Institute for Aerospace Survey and Earth Sciences (ITC); ARTEMIS and GIS training course on crop forecasting applications, Nairobi, May 1992;

(l) FAO Expert Consultation on Agricultural Crop Forecasting based on Integrated Agrometeorological and Remote Sensing Techniques, Rome, June 1992;

(m) FAO/Argentina Workshop on Remote Sensing Applications to Land Degradation Assessment, La Plata, February 1992;

(n) FAO/ESA Regional Training Course on Agricultural and Forestry Applications of Satellite SAR Imagery, 1992;

(o) ESCAP/United Nations Development Programme (UNDP) Regional Workshop on Uses of Microwave Imaging Radar Data and High Resolution Satellite Data for Thematic Mapping, China, March 1992;

(p) ESCAP/UNDP Workshop on Application of Remote Sensing and Geographic Information Systems for Islands Development Planning, Western Samoa, May 1992;

(q) ESCAP/UNDP Workshop on Remote Sensing and GIS Applications for Tropical Humid Environment Monitoring, Malaysia, June 1992;

(r) ESCAP/UNDP Working Group Meeting on Regional Information System (RIS) and Education Focal Points, Philippines, August 1992;

(s) ESCAP Meeting of Directors of the Nations' Remote Sensing Centres/Programmes in the ESCAP Region, on International Space Year; Ninth Session of Intergovernmental Consultative Committee; Tripartite Review Meeting for the Regional Remote Sensing Programme; Pakistan, October 1992;

(t) ESCAP/Asian Association for Remote Sensing (AARS) Asian Conference on Remote Sensing, Mongolia, 1992;

(u) United Nations/FAO/ICTP Training Course on Data Analysis and Management, 1993;

(v) ESCAP/UNDP Training Workshop on Spatial Data Management for Natural Resource Assessment, India, March 1993;

(w) ESCAP/UNDP Workshop on the Use of GIS for Urban Management, Sri Lanka, May 1993;

(x) ESCAP Symposium on Remote Sensing and GIS for Natural Disaster Protection and Mitigation, Viet Nam, August 1993.

14. ESCAP Meeting of the Directors of the National Remote Sensing Centres/Programmes in the ESCAP Region; Tenth Session of Intergovernmental Consultative Committee, Tripartite Review Meeting of the Regional Remote Sensing Programme, Islamic Republic of Iran, October 1993.

15. ESCAP/AARS Asian Conference on Remote Sensing, 1993, venue to be decided.

16. ESCAP Focal Point Meeting for South Pacific, Remote Sensing and GIS for Land and Marine Applications, venue to be decided, 1993.

17. UNEP has routinely organized a number of long-term postgraduate courses on the environment, e.g., at Tufts University, United States, and at the Dresden University of Technology, Germany, which now includes remote-sensing aspects. These courses will continue in 1992 and beyond.

18. UNEP and UNITAR, as an Earthwatch activity, with support from the Government of Switzerland, are conducting a series of four-month-long training courses under the GEMS-Africa programme, held at the Regional Centre for Services in Surveying, Mapping and Remote Sensing, Nairobi (RCSMMRS), to provide training in remote sensing and GIS technology to participants from African countries. On returning to their countries, trainees serve as nuclei for future national GRID-compatible centres. Training takes place at RCSMMRS. Curricula are also being developed in the countries of the South Pacific Regional Environment Programme (SPREP) and ways are being sought to develop a curriculum for African and Latin American regions. These programmes are being developed within the framework of GEMS using the GIS capabilities of GRID.

19. UNEP, as an Earthwatch activity, in cooperation with the United Nations Centre for Human Settlements (UNCHS) (Habitat) through its GRID-Nairobi facility, is using high-resolution satellite images (SPOT) (10 x 10 m) to produce data for the Centre's urban management programme. The objectives are: (a) to test the applicability and limitation of high-resolution satellite data for basic data for urban management and planning, including environmental, land management and infrastructure issues under different geographic conditions; and (b) to analyse the level and techniques for ground truth needed for potential applications in cities of the developing world. The first cities covered are Manila and Dar es Salaam, and during 1992-1993, 12 more cities in the developing world will be covered. The work is being done within the framework of GEMS using GIS capabilities of GRID.

20. UNEP, in cooperation with the USSR State Committee for Forestry, will hold in 1992 a training seminar on forestry applications of remote sensing for Asia and the Pacific countries.

21. ECA, in cooperation with the Outer Space Affairs Division of the United Nations, will solicit the establishment of a regional centre for space science and technology education in Africa as a contribution to strengthening the human resources development in the region.

22. ECA continues to promote training in GIS for natural resources management and environmental monitoring. In cooperation with FAO, ECA will hold an ad hoc workshop on the development of GIS for natural resources development and environmental monitoring in Africa. The workshop will bring together technical experts involved in the promotion of GIS technology and its

applications. Based on the workshop, guidelines for future activities will be created.

23. ECA will cooperate with FAO and other participating agencies on land use and land cover mapping in Africa.

24. RCSSMRS, in cooperation with the Government of France, plans to organize several regional and national training courses and workshops in remote sensing and for participants from eastern and southern African countries. The programme will concentrate on the sensitization of decision makers.

25. RCSSMRS will be strengthening its remote sensing and GIS capabilities by harmonizing all activities concerning the training and application programmes at the Centre. Emphasis will be placed upon holding training courses in member States.

26. RCSSMRS, in collaboration with ESA, plans to hold training courses on remote sensing for the countries of eastern and southern Africa (see A/AC.105/465, para. 24).

27. RCSSMRS and FAO will continue to organize regional and national training courses in remote-sensing applications to food security programmes for IGADD and SADCC countries (see A/AC.105/465, para. 25).

28. RECTAS, supported by EEC/ITC/Group for the Development of Aerospace Remote Sensing (GDTA), will organize:

(a) A workshop in remote-sensing applications to population census, 1992;

(b) A workshop on digital image processing applications to renewable resources, 1992;

(c) Two workshops in remote sensing and GIS natural resources management, 1992/93.

29. Beginning in 1992, and continually thereafter, RECTAS will offer long-term training courses in remote sensing at the technician, technologist and postgraduate levels.

30. CRTO will implement a new organizational structure which will be reviewed at the next meeting of the ministerial management committee, to take place in the near future. Accordingly, improved and up-to-date courses and services are expected to be available.

31. The WHO environmental health (EH) control of tropical diseases (CTD) programmes and the FAO Remote Sensing Centre continue to investigate the possibility of organizing a training course on the use of remote sensing in monitoring water resource development projects which could create habitats favourable to disease vectors. This activity is coordinated by the

secretariat of joint WHO/FAO/UNEP/UNCHS Panel of Experts on Environmental Management for Vector Control (PEEM).

32. The United Nations Department of Technical Cooperation for Development, Natural Resources and Energy Division (NRED), is planning for the period 1992/93 a seminar on cartographic data display which includes the digital processing of satellite data and geographic information systems.

33. UNITAR training programmes in GIS, remote sensing and Image Processing (IPS) for management of natural resources and environment, ongoing for six years, are conducted with UNEP, the Swiss Ecole Polytechnique Fédérale de Lausanne (EPFL), the Graduate School of Geography, Clark University, United States, and the Environmental Systems Research Institute (ESRI), of Redlands, California, will conduct courses for 1992 and 1993 and beyond.

34. The UNEP/UNITAR Advanced Workshop for GIS Trainees from Latin America will be held at Santiago, Chile, from 6 to 11 January 1992.

35. The UNEP/UNITAR/EPFL Training Session on GIS Applications is to be held at Lausanne, Switzerland, from 17 February to 15 May 1992.

36. The UNEP/UNITAR/United Nations Sudano-Sahelian Office (UNSO) Training Course for Scientists from CILSS member States will be conducted at Niamey, the Niger, from 17 February to 15 May 1992.

Fellowships

37. The United Nations Programme on Space Applications, together with a number of Governments and international organizations, provides long-term fellowships for candidates from developing countries to undertake in-depth training, as follows:

(a) The Government of the Union of Soviet Socialist Republics intends to initiate a new fellowship programme with emphasis on remote-sensing technology applications in the developing countries. The programme, which initially will benefit an anticipated 20 to 25 participants, will provide research opportunities in (i) development of new data analysis techniques, (ii) development of new instruments for remote sensing and (iii) development of space manufacturing (manufacturing of materials in space). The programme is a joint venture of Glavkosmos, the State Committee on Public Education, Lumumba University and other research centres in the Soviet Union. The fellowship programme will be tenable at the Centre for Research and Studies for Foreign Specialists. Up to 50 per cent of the participants will be selected on the basis of bilateral arrangements between the USSR and other interested Governments; the remaining participants are to be invited under the auspices of the United Nations Space Applications Programme;

(b) The Brazilian Government has ongoing fellowships for 10 participants from Latin America and the Caribbean for training in remote sensing in 1992;

(c) ESA has renewed its offer of a one-year fellowship in remote-sensing information systems tenable at the European Space Research Institute (ESRIN), Frascati, Italy, in 1992.

38. The United Nations Department of Technical Cooperation for Development is focusing on training programmes and placement of fellows through DTCD's Fellowship Service in its Programme Support Division. Fellowships are a substantial part of all projects in NRED and are integrated into the overall development objectives of UNDP-financed projects.

39. In the next few years UNESCO will support the following postgraduate training courses dealing with the applications of remote sensing to integrated natural resources research, management and development:

(a) Postgraduate course in integrated study and rational use of natural resources at the universities of Paris, Montpellier and Toulouse, France;

(b) International postgraduate training courses on remote-sensing applications, digital image processing and aerospace surveys for applied geomorphology and engineering geology, at ITC, Enschede, the Netherlands;

(c) International postgraduate training course on photo-interpretation applied to civil engineering and to geology, at the Instituto Geografico Agustín Codazzi (IGAC), Bogotà;

(d) UNESCO's Marine Sciences Training and Education Programme (TREDMAR) will make available its third computer-based learning module, "Application of Marine Image Data" by the end of 1991 and the fourth module by 1992. The overall objective is to help strengthen international satellite oceanography training and education by setting up a network of lesson users and producers. At present, the network consists of several hundreds of lesson users in about 60 countries, a few dozens of which have expressed interest in contributing lessons to the additional modules;

(e) UNESCO cooperates with FAO in organizing postgraduate training in the use of remote-sensing images in water resources studies;

(f) The Intergovernmental Oceanographic Commission of UNESCO organizes regional training courses on the applications of satellite remote sensing to marine studies, making use of the aforementioned computer-based learning modules; these training courses should continue in 1992 and beyond.

40. ECA, in support of human resource development in remote sensing and GIS in Africa, will continue to solicit fellowships from the agencies within the United Nations as well as other donor countries and agencies (see A/AC.105/465, para. 32).

41. ESCAP/UNDP/RRSP plans to provide matching support for fellowship studies granted by member Governments for in-depth study on information analysis and GIS, in 1992.

42. RRSP will provide matching travel support for in-depth study on remote-sensing applications, in 1992.

43. RRSP plans to offer matching travel support for two 9-12-month in-depth research-oriented studies. Fellowship studies will be granted by member Governments in 1993.

2. Expert services and survey missions to identify specific areas of applications relevant to a given country or group of countries and to carry out specific studies on pilot projects

Provision of expert services

44. The United Nations will continue to provide technical advisory services to implement the proposal for establishing, within an existing viable institution, a remote-sensing information programme in the ECA region.

45. ECA continues to provide technological and managerial advisory services to the regional centres and organizations that are under its auspices, namely, RCSSMRS, RECTAS, CRTO and the African Organization of Cartography and Remote Sensing (AOCRS) at Algiers. Further evaluation missions will be mounted to member States in response to their requests.

46. The FAO Remote Sensing Centre (FAORSC) provides technical support to some 60 projects annually (see A/AC.105/465, para. 39).

47. FAO will continue to assist its regional offices, United Nations regional economic commissions and regional remote-sensing centres in the efficient use of appropriate remote-sensing technology for the mapping, assessment and monitoring of renewable natural resources and natural disasters.

48. FAO will establish an agricultural resource information centre in Libya that will involve the creation of a remote sensing and GIS facility for use in the preparation, archiving and analysis of new thematic data on natural resources.

49. FAO, under the auspices of a United States Agency for International Development (USAID) project, assists in developing a Nile forecasting centre within the Ministry of Public Works and Water Resources in Cairo to monitor and forecast the flows of the Nile River and its tributaries. The project is designed to assist Egyptian planners in the more effective regulation of the Nile waters stored in Lake Nasser, with an integral part involving the real-time receipt and processing of environmental satellite data for precipitation estimation. The project will be partially contracted to the National Weather Service of NOAA for the development of hydrologic and hydroclimatic models.

50. FAO is assisting the Government of Afghanistan in preparing for the rehabilitation of the agricultural sector through an inventory of current land utilization. The project conducted during 1992/93 will produce a series of new land cover maps at 1:100,000 and 1:250,000 and statistics for agricultural areas. Data generated from the project will be compared with the historical land use situation and used as a basis for planning the rehabilitation of the agricultural sector.

51. UNEP, through GEMS, will develop a global vegetation classification through aerial photographs to satellite images that can be used from ground surface. The GEMS Harmonization of Environmental Measurement (HEM) project is based in Munich, Germany. Experts will begin work on the project in 1993.

52. The World Bank will sponsor remote sensing and GIS activities that have strong operational focus and will include: (1) development of collaborative programmes with other international organizations, public interest groups, non-governmental organizations, scientific bodies and the private sector; (2) provision of technical assistance to World Bank member Governments in remote-sensing and GIS applications; (3) provision of training for Bank and member countries staff; and (4) development of research programmes on remote-sensing applications. The Bank will place more emphasis on remote sensing and GIS for assessing environmental impacts of projects and for supporting national and regional mapping programmes, for 1992 and 1993 and beyond.

Study and pilot projects

53. DTCD/NRED of the United Nations will continue to include and use new methodologies for resources exploration and studies related to the application of sophisticated digital image processing in response to requests from the Committee on Natural Resources. Also, in response to requests of States Members of the United Nations, DTCD will continue to serve and assist in the design, execution and financing of remote-sensing projects that have training, consultancy and delivery of equipment as major components. With respect to operational activities DTCD/NRED will further provide its technical advisory services and project execution. The Technical Assistance Recruitment and Administration branch is supporting those activities through the placement of experts in projects.

54. ESCAP/UNDP/RRSP will conduct research pilot projects in 1992 through DTCD on the uses of microwave remote sensing and high-resolution satellite imagery for resource assessment, and on regional vegetation mapping, both of which will include a call for proposals.

55. ESCAP/UNDP/RRSP plans to offer in 1993 two or three pilot projects on a regional scale to be arranged through DTCD with the participation of several countries.

56. FAO preparatory work for forest resources assessment (FRA) has revealed that remote-sensing data is indispensable for data collection. An ad hoc

group of experts from, inter alia, UNEP, FAO and ISPRA will continue, together with NASA, to use remote sensing in mapping forests on a global scale. The results of FRA will be presented at ISY in 1992 (see A/AC.105/465, para. 48).

57. FAO prepared a project document for the mapping of vegetation and land use in Africa at a scale of 1:1 million and for selected areas at a scale of 1:250,000 using high-resolution data.

58. UNEP, as an Earthwatch activity, has been carrying out through its GRID-Geneva facility a feasibility study of deforestation monitoring through the automated processing of remotely sensed AVHRR NOAA satellite data. Specifically, this has involved implementation, development and testing of specialized change detection software and generation of maps showing deforestation in selected parts of Amazonia in 1984-1988 and 1988-1990, with validation using high-resolution data from Landsat TM. The work will continue in 1992 and 1993.

59. Also as an Earthwatch activity, UNEP, through its GRID-Sioux Falls facility in the United States is examining historical Landsat MSS data recently released for the period 1972-1988 to identify time-separated pairs of MSS imagery of areas of significant change. Changes will be examined in conjunction with natural resource monitoring and assessment experts through GEMS and other sources. These activities will continue in 1992 and 1993.

60. During 1992 and beyond, UNEP will acquire through the GRID-Sioux Falls facility 1-km AVHRR data to prepare composite data sets in a time sequence permitting maximum utility of the data for environmental studies. Further, the Earth Resource Observation System (EROS) Data Center is establishing a network of AVHRR stations around the world so as to assemble an archive of 1-km resolution AVHRR. UNEP will participate with the Center in the construction of timely data sets for global coverage.

61. In an additional Earthwatch activity, UNEP, in cooperation with the International Board for Plant Genetic Resources (IBPGR), through its GRID-Nairobi facility, is using high-resolution satellite data (SPOTS XS) to map the land cover of Socotra Island (Yemen). These data are being incorporated into a GIS and merged with ancillary data (elevation, geology, precipitation and others) to produce a practical vegetation map. This work will continue in 1992.

62. UNEP has placed a team in Kuwait to coordinate the United Nations Inter-Agency Plan of Action for the area affected by the Gulf conflict. The team is working in association with the Regional Organization for the Protection of the Marine Environment (ROPME). The initial phase of the programme includes surveys and assessments concerning the environmental consequences of the Iraq-Kuwait conflict and establishment of a computerized data system (CDS). The implementation of the main programme will take place in 1992-1993 and will involve satellite monitoring of affected areas and of changes resulting from rehabilitation activities for marine, coastal and terrestrial areas. The work of CDS, which involves a telecommunications system for world-wide data exchange, will continue in 1992.

63. UNEP, as a further Earthwatch activity, through its desertification control programme in association with the Institut Geographique Nationale (IGN) of France, is developing methods to assess desertification in the arid, semi-arid and sub-humid zones of the southern Sahara. Five parallel transects are being surveyed from the air and compared against comparative interpretation of 1:50,000 scale aerial photographs taken in the 1950s and again in 1987; recent SPOT satellite images are also being used.

64. FAO, in cooperation with the Government of Netherlands, continues to develop and provide its operational remote sensing and agrometeorological inputs into the FAO Global Information and Early Warning System (GIEWS) and the Desert Locust Plague Prevention Programme through the upgraded ARTEMIS system and the organization's agrometeorological data network and processing system. Developmental activities include the implementation of an integrated computer workstation, capable of management and integrated analysis of data from different sources on a geocoded basis to support GIEWS global, regional and national food security situation assessments. Furthermore, the use of GIS technology to support crop production forecasting is being investigated in a pilot study for Ethiopia.

65. Through a French Trust Fund remote-sensing project, FAO continues to develop and disseminate operational and cost-effective techniques on the use of high-resolution satellite data and geographic information systems in the agriculture, forestry and fisheries sectors in developing countries. These techniques are based on pilot and field projects implemented and/or coordinated by the French Trust Fund for various technical departments of FAO. Particular developments will be made with the FAO Investment Centre, which is in charge of identifying and preparing rural projects for funding by the international development banks.

66. FAO and ESA will continue their cooperation in developing appropriate techniques for the applications of satellite SAR imagery to agriculture and forestry in developing countries (see A/AC.105/465, para. 53).

67. UNEP, as an Earthwatch activity, in conjunction with the Instituto Argentino de la Desertificación de las Zonas Aridas (IADIZA) Argentina, through its GRID-Nairobi facility, is using NOAA AVHRR data to produce a vegetation map of a transect from the Pacific to the Atlantic in southern South America to produce methods for extrapolating vegetation classes to areas within one degree of latitude north and south of the study area. Classification results for different dates will be integrated within a GIS to identify vegetation changes over time, and to correlate these changes with the evolution of fragile low-latitude ecosystems. The work will continue in 1992.

68. As part of its lithosphere programme, and in cooperation with the Scientific Committee on Problems of the Environment (SCOPE/ICSU) and the Institution of Biogeochemistry and Marine Chemistry, Hamburg, Germany, UNEP is using satellite-derived data to determine suspended matter, phytoplankton and Gelbstoff (a fraction of the dissolved organic matter) in rivers, estuaries and coastal waters and to survey the development of spring algal-algae

blooms. The study will be completed in early 1992. The same institutes are cooperating in a study of particle flux in the ocean using remotely sensed measurements to obtain data on global-scale variability in the concentration of chlorophyll in the upper ocean. The project will contribute to the Joint Global Ocean Flux Study of the International Geosphere-Biosphere Programme.

69. Through its soils programme, UNEP will complete in 1992 production of a series of thematic land and land suitability maps at a scale of 1:1 million. The maps are for a demonstration area in Zambia and show soils, water resources, geology, climate, vegetation/land cover and land use. Various satellite-derived data will be used in their preparation and they will be used to demonstrate how such maps can be used for resources inventory and land use planning. The project will be completed in 1992.

70. In the context of an Earthwatch activity carried out through the Bangkok Centre of GRID, UNEP is undertaking the following: utilization of both Landsat and NOAA AVHRR data to assess forest conditions along the Thailand/Myanmar border; utilization of NOAA AVHRR data to produce a 1.1-km resolution mosaic of South-East Asia for classification into forest/non-forest categories of land cover to be verified from higher-resolution Landsat and NOAA AVHRR data in a study of the environment of Lake Songkla in southern Thailand, carried out in cooperation with the International Lake Environment Committee (ILEC), Prince Songkla University and the Thailand Office for the National Environment Board. These activities will extend into 1993.

71. In an additional Earthwatch activity carried out through the Norwegian National GRID-Arendal Centre, UNEP is associated with the further development of GRID-Arendal's information system, specifically the use of Landsat MSS and TM data for change detection in border areas between Finland, Norway and the USSR; land classification within Hardangervidda National Park, Norway, based on SPOT HRV and Landsat TM data; and the use of NOAA AVHRR data studies for detection of ice movements in the Barents Sea. Moreover, a cooperative project is being developed for a land-use survey of the Baltic Sea catchment area using NOAA AVHRR and, possibly, other satellite data. The Baltic Sea project will involve cooperation among institutes in countries around the Baltic Sea and will start in late 1992 or early 1993.

72. UNEP is also carrying out a number of Earthwatch-related activities through its desertification control programme. In association with the International Soil Science Society, ISRIC and the Dutch Soil Survey Institute (STIBOKA) have completed a global assessment of soil degradation (GLASOD) and published a global soil degradation status map at an average scale of 1:10 million. The same organizations are developing a world soil and terrain digital database (SOTER) involving detailed soil and land mapping at a scale of 1:1 million. Surveys of the first two sites have been completed in parts of Argentina, Brazil and Uruguay; and adjacent areas in mid-west Canada and the United States. Work on other sites is commencing. Satellite remote-sensing products are used to generate some of the data as well as to check and compare material from various participating institutes. The full SOTER programme will take 10-15 years to complete. The various data planes

used in GLASOD have been combined with NOAA AVHRR 1-km resolution data, elements of which are to be contained in the World Atlas of Thematic Indicators of Desertification due for publication in 1992 prior to the United Nations Conference on Environment and Development (see A/AC.105/465, para. 50).

73. UNESCO and ITC are continuing the implementation of a cooperative programme entitled "Geo-information for environmentally sound management of natural resources", which involves the application of GIS including the use of remote sensing and training activities in the fields of ecology, hydrology and geology. In addition, seminars for decision makers in these fields will be organized.

74. UNESCO, with the International Union of Geological Sciences (IUGS) and the Royal Museum of Central Africa (Belgium), are initiating the third phase of the Geological Applications of Remote Sensing (GARS) African project focusing on the creation of a remote-sensing user network in Burundi, the United Republic of Tanzania, Uganda and Zambia. Also, UNESCO is initiating together with IUGS a new phase of GARS Latin America, a project focusing on the use of microwave space-borne sensor data for the mitigation of natural hazards in the Andean region.

75. Within the framework of the cooperation between the Intergovernmental Oceanographic Commission (IOC) of UNESCO and WMO, an ad hoc Group on Ocean Satellites and Remote Sensing has been jointly established by the WMO Commission for Marine Meteorology and the Joint IOC-WMO Committee for the Integrated Global Ocean Services System, mainly to analyse the requirements of marine meteorology and operational physical oceanography for remote-sensing data. The Group is initially planning to work in a four-year cycle: (i) polar-orbiting Earth observation satellites; (ii) geostationary satellites; (iii) ground-based high-frequency and radar systems; and (iv) data access to the systems. In the same context, IOC and WMO will co-sponsor a Joint WMO-IOC Technical Conference on Space-based Ocean Observation, tentatively scheduled to take place at Bergen, Norway, in August/September 1993. Additional co-sponsorship of the Conference is invited.

76. The WHO programmes in tropical diseases research (TDR), CTD and environmental health (EH) continue to investigate the opportunities offered by remote sensing for improving research and control of vector-borne diseases. The WHO-executed Onchoceriasis Control Programme is currently expanding its network and the tele-transmission of hydrological information through its own emitting and receiving stations in 11 West African countries. WHO and FAO are planning a joint pilot project.

77. The WHO Division of Emergency Relief Operations, together with one of its collaborating centres, has developed a global disaster events database that covers disasters from public health aspects since 1900 and is constantly being updated. Information systems are also being developed for health management of disasters, with appropriate linkages to the early warning systems.

78. FAO will use data from the ARTEMIS system to improve estimates of the length of the growing period, particularly in the Sahel region (see A/AC.105/465, para. 59).

79. The Fisheries Department of FAO will increasingly use remote sensing for fisheries and aquaculture projects in 1992-1993 and future years (see A/AC.105/465, para. 60).

80. FAORSC will continue to provide technical assistance to the Forestry Department in the assessment of existing forest resources and trends in deforestation, forest degradation and plantations (see A/AC.105/465, para. 61).

81. UNEP, as part of its water programme, is carrying out in cooperation with ESCWA an assessment of water resources by using remote-sensing techniques in the ESCWA region. This includes compilation of hydrological-hydro-genealogical maps of the main shared water basin, produced with the help of remotely sensed data and GIS. The completion of the programme scheduled for the end of 1993 but has been delayed by the Gulf crisis (see A/AC.105/465, para. 62).

82. RCSSMRS, in cooperation with the Government of France, will initiate a pilot project using SPOT data for mapping and monitoring the mangrove-covered area on the Indian Ocean coast neighbouring Mombasa, Kenya.

83. RCSSMRS will continue hosting the microcomputer-based GIS project for training nationals of various African countries. The project is executed jointly by UNEP and UNITAR and will strengthen the capability of the member countries to rationally manage and develop their natural resources.

84. In cooperation with the Kenya Meteorological Department, RCSSMS will establish a datalink to obtain satellite microwave data for the various projects at the Centre.

85. RECTAS will carry out a pilot project on urban development planning in Ibadan, Nigeria.

86. RECTAS, supported by the World Bank, will carry out in 1992/93 a study to assess rice production in northern Ghana using remote-sensing data.

87. FAO will complete phase I of two regional remote-sensing/food security early warning projects covering the countries of IGADD and SADCC, with funding by the Japanese Trust Fund (see A/AC.105/465, para. 65).

88. The Indian Ocean Marine Affairs Cooperation (IOMAC) programme, in collaboration with the United Nations Outer Space Affairs Division, is planning to undertake small-scale feasibility projects of satellite remote-sensing applications for mapping, monitoring and managing of coastal resources (see A/AC.105/465, para. 67).

89. The International Radio Consultative Committee (CCIR) of ITU will continue its studies relating to remote-sensing systems within the framework of its Study Group 7 (science services). The results of studies in the 1986-1990 study period approved by the XVIIth CCIR Plenary Assembly (Dusseldorf, Germany, 1990) have been published in CCIR, volume II.

90. UNDRO will continue to cooperate with organizations within the United Nations system and other specialized organizations in the study on a practical use of remote-sensing control for disaster management.

3. Dissemination of information on the status of technology

Continuing activities

91. Since 1989, the United Nations Space Applications Programme has published an annual collection of papers selected from among those presented at the meetings, workshops and training courses organized under its auspices (see A/AC.105/465, para. 69). The publication covers different aspects of space science and technology including remote sensing, satellite meteorology, satellite communications and basic space science. It includes papers that are broad in scope and have enduring interest.

92. ESCAP/UNDP will continue to operate the Regional Information Service (RIS) on remote sensing during 1992 and 1993 and onward, providing important and interesting RIS output. Four issues of the remote-sensing newsletter and two issues of the Asian-Pacific Remote Sensing Journal will be published in 1992 and 1993. Reports and proceedings of seminars/workshops/meetings will continue to be published regularly.

93. ECA will continue to publish annually the bulletin on cartography and remote sensing. The bulletin will serve to disseminate information on the status of mapping, remote sensing and GIS to persons and institutions in member countries involved in planning and development.

94. ECA, in cooperation with the United Nations Space Applications Programme and other donor countries and agencies, plans to hold a space conference for Africa. The main objective is to bring together African decision makers and scientific leaders to address the regional and global issues with regard to space science and technology for development.

95. UNEP, as an Earthwatch activity, through its International Referral System for Courses of Environmental Information (INFOTERRA), has over 200 registered sources that provide information on remote sensing or use the technique in their activities relating to pollution monitoring, resource mapping, atmosphere and climate. Additional sources will be registered in the next few years. INFOTERRA also uses satellite communications for information transmission.

96. UNEP, also as an Earthwatch activity, through the GEMS Monitoring and Assessment Research Centre (MARC), produces Environmental Data Report, a biennial compendium of environmentally related data, with three editions including the most recent. The report includes satellite-derived data, most notably those dealing with climate, oceans, aquatic resources, land cover and land resources. The Report also contains inventories of operational satellites having meteorological and Earth resources monitoring capabilities. The next edition in the series is scheduled for publication in May 1993.

97. Through its terrestrial ecosystem programme, UNEP supports the operation of a microbial strain data network, a computer-based information network on micro-organism strains currently on line with access to the data bank as well as an information board through international telecommunication systems. A similarly operated on-line database is being developed on genetically modified and alien organisms released into the environment.

98. In a further Earthwatch activity, UNEP, through GEMS, will continue to cooperate with UNESCO and the Swiss Federal Institute of Technology, Zurich, in a World Glacier Inventory. Results have been published as reported in 1991, a process that will continue into 1993 and beyond. A computer-based glacier database continues to operate for the advanced analysis of glacier and climate data.

99. FAO will continue to publish and review technical reports on agriculture, fisheries and forestry applications of remote sensing and GIS in 1992-1993 and future years.

100. FAO plans to strengthen further its role as the clearing-house for information on the agricultural, forestry and fisheries applications of remote sensing. In 1991 its Remote Sensing Centre will begin publishing a quarterly FAO Remote Sensing Newsletter.

Special projects or ad hoc activities

101. The Joint IOC/WMO Committee for the Integrated Global Ocean Station System (IGOSS) is currently studying the operational exchange of remotely sensed oceanographic data as a part of the IGOSS data-processing and services system. Archiving and the exchange of non-operational remotely sensed oceanographic data are being studied by the IOC Commission on International Oceanographic Data and Information Exchange (IODE) (see A/AC.105/389, para. 41). The IODE Task Team on Remotely Sensed Oceanographic Data is trying to find an answer to such problems as the absence of a standard format for oceanographic satellite data products; the lack of compatibility between the satellite data products from different centres, etc. The remote-sensing data subset of the Marine Environmental Data Information (MEDI) Catalogue has been published and the whole MEDI referral system operated by IOC (see A/AC.105/373, para. 37) is currently under revision, taking into account the growth in the volume and variety of oceanographic data holdings, recent advances in computer technology and the changing requirements of the scientific community. Within the framework of the IOC Global Investigation of

Pollution in the Marine Environment (GIPME), the possibility of using remotely sensed data to monitor marine pollution is being studied through groups of experts and case-studies. Studies will be carried out on applications of remote sensing in coastal zone and shelf seas dynamic studies. IOC has initiated consultations on the potential of satellite observing systems in the 1990s for oceanography and their future role.

102. FAO, in addition to disseminating the products from the upgraded ARTEMIS system concerning precipitation and vegetation condition assessments in Africa, the Near East and South-West Asia, disseminates information about the technology and techniques used through information brochures and microcomputer-based demonstrations.

103. With the transfer of its Agrometeorology Group from the Plant Production and Protection Division to the Remote Sensing Centre's Research and Technology Development division, FAO is integrating remote-sensing and agrometeorological data/information input to the FAO GIEWS and Desert Locust Programme. In cooperation with the University of Arizona, United States, a hardware/software capability, based on the use of microcomputers, is being implemented to support this integration and to improve the food security assessment operations of GIEWS. Other FAO projects to be carried out in cooperation with other agencies include the following:

(a) In 1990 FAO began the implementation of a three-year USAID-funded project for model forecasting the Nile River to improve irrigation management in Egypt (see A/AC.105/465, para. 80 (a));

(b) Under the auspices of a Libyan trust fund, FAO will begin implementation of a three-year project aimed at mapping natural resources for agricultural use and planning (see A/AC.105/465, para. 80 (b));

(c) Under a programme of assistance to Afghanistan jointly funded by UNDP and the Office of the Coordinator for Humanitarian and Economic Assistance relating to Afghanistan (UNOCA), FAO will prepare a systematic land-cover map (see A/AC.105/465, para. 80 (c));

(d) In its regular programme and field activities for the coming year, the Land and Water Development Division of FAO foresees an intensification of the use of remote-sensing techniques (see A/AC.105/465, para. 80 (d)).

104. The World Conservation Union (IUCN)/World Wide Fund for Nature (WWF)/UNEP World Conservation Monitoring Centre (WCMC) forms part of the GEMS monitoring and assessment network. WCMC gathers, analyses and disseminates information on global biodiversity. GIS produced map-based outputs increasingly manage WCMC's information holdings and enable its biodiversity data to be integrated with other environmental parameters for improved land-use planning. WCMC works closely with UNEP through GEMS/GRID and others in Earthwatch activities involving the transfer of data sets derived from satellite imagery, especially habitats and vegetation types, which are incorporated into its GIS applications. WCMC, as an Earthwatch activity, is currently producing the

Conservation Atlas of the Tropical Forests of the World. Volume 1 (Asia and the Pacific) was published in 1991 and volumes 2 and 3 (Africa and the Americas, respectively) will be published in 1992. This atlas required the production of maps of tropical moist forests, often using satellite imagery analysed in-country, yielding a global overview at a scale of 1:1 million. In collaboration with the British Antarctic Survey, the Scott Polar Research Institute and countries working through the Scientific Committee on Antarctic Research (SCAR), WCMC is producing the definition GIS database of Antarctica for multidisciplinary scientific research and future environmental management. Satellite imagery is being used extensively in its production. WCMC is also producing a GIS environmental map library to integrate its biodiversity information with other environmental and natural resources data sets collated by other agencies.

4. Establishment of centres for space science and technology education

105. The United Nations Space Applications Programme has convened three regional meetings of experts on space science and technology and its applications within the framework of educational systems as well as an international meeting of experts on the development of skills and knowledge in remote-sensing technology in the developing countries. The deliberations and the recommendations of the meetings specifically focused on the need for the United Nations to assume a major leadership role in promoting the necessary educational opportunities, particularly in the developing countries, for the integration of space science and technology into national educational programmes. These recommendations have subsequently been developed into a work project document for the establishment of regional centres for space science and technology education in existing national/regional educational institutions in Africa, Asia and the Pacific, Latin America and the Caribbean, and Western Asia. This is in conformity with the recommendation of the General Assembly, in its resolution 45/72 of 11 December 1990, that the United Nations serve as an instrument for the establishment of regional centres for space science and technology education in developing countries.

106. Each of the centres will be housed in a major science-and-technology-oriented university or a space research institution with an ongoing education programme to afford the centre optimal utilization of the existing professional staff and physical infrastructure at the host institution. The centre's initial programme will focus on remote-sensing technology and related application disciplines. Each of the centres will be specifically designed so that it may:

(a) Contribute significantly to indigenous capability development in remote sensing, including satellite meteorology and environment-related disciplines in each participating country;

(b) Enhance scientific and technical education in each participating country;

(c) Enhance the quality and quantity of contributions of graduates of participating countries in overall development of their respective nations and in the management of their resources and their environment;

(d) Strengthen the capabilities of institutions of higher learning and national/regional remote-sensing user assistance and training centres.

B. COMMUNICATIONS

1. Education and training programmes

Training courses/workshops/seminars

107. The United Nations Space Applications Programme plans to organize a Workshop on Space Communications for Development in cooperation with the Government of the USSR, to be held at Dubna, USSR, in 1992.

108. The United Nations International Seminar on Space Communications Systems will be held in cooperation with the Government of Greece in 1993.

109. WHO will continue its efforts towards the development and strengthening of communications systems support to primary health care in remote areas. The activities will include increasing training opportunities and the promotion of intersectoral collaboration and technical cooperation among developing countries (see A/AC.105/415, para. 68).

110. UNDRO, following its 1991 Tampere Conference on Disaster Communications, will convene a conference in 1993 for the negotiation of an international convention on disaster communications, establishing mechanisms to improve international cooperation.

111. UNDRO plans to continue to participate in regional workshops/seminars on disaster communications for 1992-1993 and beyond.

112. The United Nations/Austrian Communication Workshop will be held at Graz, Austria, in 1993.

Fellowships

113. Through the United Nations Programme on Space Applications, Governments and international organizations are providing long-range fellowship support for candidates from developing countries, as follows:

(a) The Government of Austria has renewed its offer of two fellowships for study and training in the area of microwave technology for satellite communication. The fellowships are tenable in 1991-1992 at the Technical University of Graz, Austria;

(b) ESA has renewed its offer of a one-year fellowship in the field of communications engineering tenable at the European Space and Technology Centre (ESTEC), Noordwijk, the Netherlands, in 1992.

2. Expert services and survey missions to identify specific areas of applications relevant to a given country or group of countries and to carry out specific studies on pilot projects

Provision of expert services

114. ITU activities in the area of satellite communications include the following:

(a) ITU will continue to provide, at the request of member administrations, the experts participating in the planning of regional or domestic satellite communication systems;

(b) ITU will provide expert advice on satellite broadcasting to the Saudi Arabian Ministry of Information until February 1992;

(c) Member administrations will continue to be informed regularly through the International Frequency Registration Board (IFRB) Weekly Circular and the special sections annexed thereto of frequency assignments and orbital positions communicated to the board in space radiocommunication services. IFRB will also respond to requests for advice from administrations on specific topics or in providing information and documents, mainly in relation to space radiocommunication services.

115. ECA will continue to provide short-term technical assistance in the form of advisory services, specific studies and seminars for member States' telecommunications organizations for strengthening institutional capabilities and effectiveness in national development.

Study and pilot projects

116. The United Nations Space Applications Programme and UNESCO are collaborating with the Government of China in developing a satellite communications and television education programme for that country.

117. The ITU/RASCOM feasibility study was considered by the Conference of African Ministers for Telecommunications, held at Abuja, Nigeria, from 4 to 6 February 1991. The Conference decided that a dedicated satellite was the ultimate objective of the project, with its implementation phase already begun and a transitional period of 12 months to be followed by the operational stage. The RASCOM organization, which will be based in Africa, will start operating and undertake the operational stage of the project. The objective of the RASCOM project is to provide an efficient and economical means of telecommunications and information services, with a view to fostering the

socio-economic and cultural development of African countries. The requirements for satellite sound and television broadcasting for all African countries are included, using the appropriate technologies of a regional African satellite system which is to be properly integrated in the existing and/or planned national networks.

118. UNESCO activities included the following:

(a) UNESCO, as a member of the Inter-Agency Consultative Committee (IACC) on the RASCOM project, is acting in an advisory capacity to the interim bureau for setting up a permanent RASCOM organization;

(b) In the framework of ISY, UNESCO plans to devote an issue of its monthly publication, The Courier, to "Mission to Planet Earth";

(c) With respect to the decisions and recommendations of UNISPACE 82, UNESCO and the International Programme for the Development of Communication (IPDC) will continue to make every effort, within the scope of their mandate and subject to the availability of financial resources, to assist all member States, in particular the developing countries, to promote the use of space technology for economic, social and cultural development;

(d) In collaboration with developing country media organizations, UNESCO will plan and implement campaigns and training in preventive education, environment, population and science reporting; and will undertake a study in the Caribbean region, within the framework of its programme and budget for 1992/1993, on the potential contribution of modern communications media, especially satellites, to disaster and emergency warning and relief;

(e) Either by itself or in collaboration with the International Labour Organisation (ILO) and WIPO, UNESCO will undertake various actions to encourage further ratifications and acceptances of the Convention Relating to the Distribution of Progamme-carrying Signals Transmitted by Satellite (Brussels, 1974). The search for solutions of the copyright and neighbouring rights problems raised by the use of satellites for broadcasting purposes will remain one of UNESCO's concerns;

(f) UNESCO continues to examine different ways and means of making wider use of low orbit satellite information technology for education, science and environmental protection in the implementation of its programmes. These activities are conducted in close cooperation with the United Nations specialized agencies, national/regional space institutions and interested member States.

119. FAO, in cooperation with ESA, will demonstrate and test in 1992 the DIANA satellite communication system, which has been developed by European industry under ESA management. The DIANA system will transmit ARTEMIS data products from FAO headquarters to user terminals in Nairobi, Kenya; Harare, Zimbabwe; and Accra, Ghana. The demonstration and testing period will continue for one year and will include a wide variety of data, information and document transmission tests.

120. WHO follows the progress of the development of satellite networks to improve health conditions, particularly for enhanced communications support in rural areas (see A/AC.105/465, para. 99). Also, WHO is studying the feasibility of an offer by the USSR authorities for the use of existing and to-be-launched USSR low-orbit satellites for world-wide communications, particularly covering the geographical areas not already served.

121. As a follow-up to the Conference of African Ministers for Telecommunications in 1991 on the RASCOM feasibility study, ECA will provide support to ITU on the implementation of the transitional stage in which all necessary elements required to establish a RASCOM organization will be collected and presented to a special conference to be convened.

122. UNDRO will continue to cooperate with organizations within the United Nations system and other specialized organizations in the study and practical use of satellite terminals for disaster management for 1992-1993.

3. Dissemination of information on the status of technology

123. ITU permanent organs will continue to contribute in this sphere with the following activities:

(a) Studies on technology and spectrum utilization for space communications will be continued in the study period 1990-1994, in the light of technological developments by CCIR study groups 1, 4, 5, 7, 8, 10, 11 and 12;

(b) Supplement No. 1 (Effect of WARC-88 Decision) to the CCIR Handbook on Satellite Communications (Fixed-Satellite Service) has already been published. Supplement No. 2 (Computer Programmes for Satellite Communications), currently under preparation, will be published in 1991. Supplement No. 3 (Very Small Aperture (VSAT) Systems and Earth Stations) and Supplement No. 4 (Satellite Links in the Integrated Service Digital Network (ISDN)) are in preparation;

(c) The CCIR handbook on satellite-based services of time and frequency dissemination, currently under preparation, is expected to be finished by the end of 1991;

(d) The International Telegraph and Telephone Consultative Committee (CCITT) is continuing its work on a study programme concerning space technology in the area of services, e.g., maritime mobile services, land mobile services, and in the field of integrating satellite systems into the general telecommunication network. Accordingly, it is studying the use of telecommunication satellites for a whole range of transmissions: telephony, television, teleconference, data transmission, business services, communications between computers, telecommunication services to remote regions and weather forecasting. Where necessary, it also investigates the signalling

associated with these various types of information. The studies in progress relate in particular to the preparation of standards for digital networks;

(e) The International Frequency Registration Board (IFRB) organizes biennial seminars on frequency management and the use of the radio-frequency spectrum and the geostationary-satellite orbit, with a view to providing efficient technical assistance to the participating countries;

(f) ITU publishes its Telecommunication Journal of a list of satellites launched, together with their summary descriptions;

(g) The Union also publishes a Report on Telecommunication and the Peaceful Uses of Outer Space;

(h) In April 1992, the exhibition AMERICAS TELECOM, organized in cooperation with ITU, will take place at Acapulco, Mexico; followed by EUROPE TELECOM in October 1992, at Budapest. Similarly, the ASIA TELECOM exhibition will be held in April 1993 in Singapore.

124. IFRB publishes quarterly an updated list of the orbital positions assigned to space stations on board geostationary satellites, with the corresponding frequency bands.

125. UNEP-International Cleaner Production Information Clearinghouse (ICPIC) is an on-line computerized information exchange system, part of the UNEP Cleaner Production Programme to promote the use of clean production technologies on a global scale. The system provides three direct-access nodes through the telephone network and another eight access nodes through Telenet, a data packet switching system (PSS), or through another national PSS such as Thaipac for Thailand or the United Kingdom PSS. The system should be able to meet immediate and near future on-line access requests during 1992-1993 and beyond.

126. WHO will continue its efforts to develop and strengthen communications systems in support of primary health care gained by promoting the exchange of information and experiences and by recommending effective means of communication.

4. Regulation of the use of the geostationary satellite orbit and the radio-frequency spectrum allocated to space communication services

127. The Legal Subcommittee of the Committee on the Peaceful Uses of Outer Space will continue in 1992, subject to decision by the General Assembly, to consider matters relating to the definition and delimitation of outer space and to the character and utilization of the geostationary orbit, including consideration of ways and means to ensure the rational and equitable use of the geostationary orbit without prejudice to the role of ITU.

128. CCIR Study Group 4 will study further the technical characteristics of the 30/20 GHz band, interference criteria and sharing criteria as well as update technical parameters applicable to the fixed-satellite service. CCIR Study Group 11 established an active work programme for the 1990-1994 study period to prepare the technical information (including interference and frequency-sharing criteria) required to identify a suitable world-wide frequency band for high-definition television (HDTV). CCIR Study Groups 10 and 11 have set up a detailed work programme for the 1990-1994 study period to develop appropriate system specifications and to examine interference conditions as well as to establish sharing criteria for a satellite sound broadcasting service in the frequency range 500-3,000 MHz.

129. ITU will hold a World Administrative Radio Conference (WARC-92) in Spain to deal with frequency allocations in certain parts of the spectrum, particularly those involving mobile-satellite services, broadcasting-satellite services, meteorological satellite and Earth-exploration satellite services, radiodetermination satellite service space operation and space research services. The Conference will also consider possible allocations of frequency bands for certain new space service applications together with a review of the relevant administrative provisions. The CCIR report to WARC-92 on technical bases of the Conference has been prepared and published.

130. The ICAO Special Committee on Future Air Navigation Systems (FANS) has completed the first phase of its work for the development of the global communication navigation and surveillance (CNS) system concept for international civil aviation. The global CNS system concept is based on satellite technology. The concept has received wide acceptance by the ICAO Council, and international organizations have been invited to endorse it. The FANS Phase II has already begun within the second phase of the project, addressing issues related to institutional arrangements associated with the implementation of the global CNS system and the development of a global coordinated plan with appropriate guidelines for transition and monitoring of research and development programmes to ensure their coordinated integration and harmonization. In March/April 1992, the ICAO Council's special committee will meet and, tentatively in 1993, will finalize a comprehensive document on the global implementation of a future CNS (see A/AC.105/444 and Corr.1, para. 97, and A/AC.105/465, para. 112).

131. WIPO will continue to study various aspects of copyright law that relate to the use of new technologies, including transmission by satellite. The draft programme budget for 1992-1993 contains provision for continuing preparation of a possible protocol to the Bern Convention for Protection of Literary and Artistic Works which deal with a number of copyright questions relating, inter alia, to such transmissions. Those questions will also be dealt with in the context of other proposed activities, such as a model law on intellectual property rights of producers of sound recordings.

C. METEOROLOGY AND HYDROLOGY

1. Education and training programmes

Training courses/workshops/seminars

132. WMO plans to continue to collaborate with the United Nations, FAO, ESA and other organizations in the co-sponsorship of training events during 1992, including the following:

(a) Training Course on Tropical Meteorological and Tropical Cyclone Forecasting, 1992;

(b) Regional Seminar on Aeronautical Meteorology (South America, North and Central America), 1992.

133. A United Nations/FAO/ESA training course, in microwave remote sensing for Africa will be held in October 1992.

134. The WMO proposals for satellite-related events for 1993 include the following:

(a) The United Nations and WMO will co-sponsor a training event in Asia and the south-west Pacific;

(b) Training seminar on use of environmental satellite data;

(c) Framework on tropical cyclone warnings for North and Central America.

135. Through the appointment of a Director-General, ECA, in collaboration with FAO, UNEP, WMO and other United Nations agencies will continue to carry out activities within the framework of the African Centre of Meteorological Applications for Development (ACMAD) activities in agrometeorology, hydrometeorology and climatology, which will include the provision of operational weather forecasts and warnings for the African continent. In this context, training seminars and workshops will be held for middle and senior level government officials. During the 1992-1993 period and beyond, cooperation between ACMAD and the Regional Centre for Training and Application in Agrometeorology and Operational Hydrology (AGRHYMET) will be strengthened utilizing the satellite for meteorological data collection.

Fellowships

136. WMO grants fellowships under its Voluntary Cooperation Programme (VCP) and its regular budget as well as under UNDP and trust funds for studies or training in meteorology and operational hydrology, including studies and training in satellite meteorology, interpretation of meteorological satellite photographs, satellite transmission systems and nephanalysis. The United Kingdom is arranging to train, within WMO/VCP small groups of fellows for short four-month courses in the United Kingdom in the use and interpretation

of numerical weather prediction products from the Bracknell global forecast model. The training programme has been planned in support of the ACMAD project. The Governments of the United States and France are also offering similar fellowships within the framework of WMO/VCP for studies and training in numerical weather prediction and interpretation of meteorological satellite photographs.

2. Expert services and survey missions to identify specific areas of applications relevant to a given country or group of countries and to carry out specific studies on pilot projects

137. Following the recommendations of the Second United Nations Meeting of Experts on Remote Sensing and Satellite Meteorology Applications to Marine Resources and Coastal Management in the Atlantic Coast of Africa Region, held at Maspalomas, Gran Canaria, Spain, in 1991 (see A/AC.105/436), the United Nations Programme on Space Applications, in consultation with UNDP, the specialized agencies, ESA, and Member States in the Atlantic coast of Africa region, is considering the establishment of a regional programme/project on the use of space technology in various oceanographic/coastal environment fields.

138. In accordance with the recommendations of the United Nations IOMAC meeting held at Karachi, Pakistan, in July 1989, (A/AC.105/439, paras. 12-35), arrangements are being made for a pilot project with the NOAA/National Environmental Satellite Data and Information Service (NESDIS) consisting of two teams of four to five remote-sensing scientists from the IOMAC member States to work together for about six months (see A/AC.105/465, para. 122).

139. The application of satellite technology in meteorology and operational hydrology forms an important element of the technical cooperation activities of WMO. These activities are generally undertaken with assistance from the voluntary cooperation programmes of either WMO or UNDP. The following activities are planned for 1992-1993 and future years:

(a) Africa. A number of countries, including Germany, France, the United Kingdom and the United States, are donating data collection platforms (DCPs) for the collection of meteorological data via the geostationary meteorological satellite Meteosat to 15 countries in Africa in order to upgrade meteorological observations. They are being installed in Ethiopia, Kenya, the Sudan and other countries as part of an operational World Weather Watch System Evaluation for Africa (OWSE-AF). The project also includes the installation of DCP retransmission stations in various national meteorological centres and the meteorological data dissemination (MDD) function of the Meteosat operational programme. During 1992 and 1993, MDD will be evaluated as part of the OWSE-AF using MDD receiving stations located in 5 to 10 African countries. A receiving station (NOAA, AVHRR and Meteosat) has been installed at the AGRHYMET centre, in the Niger, within the framework of the French/United States contribution to the AGRHYMET Programme Phase III

(1987-1991) which permits the centre to receive daily real-time data from NOAA satellites and meteorological information from Meteosat. A pilot project consisting of the installation of DCPs using the Meteosat system is being implemented in Morocco for flood forecasting purposes. A multi-donor project is now under preparation to monitor the weather conditions affecting development, growth and movements of desert locusts in Africa. Under the project 50 automatic stations will be installed. In the Niger river basin, 64 DCPs using the Argos system will be installed. Also, FAO, in the framework of the ARTEMIS Phase II development programme, is undertaking a major satellite rainfall estimation calibration programme in cooperation with the University of Reading, United Kingdom, and regional FAO projects in the IGADD and SADCC regions. This programme, which over an extended time period has systematically correlated ground observed rainfall from approximately 1,000 meteorological stations in Africa with cold cloud duration parameters as derived from the ARTEMIS hourly Meteosat satellite observations, is expected by the end of 1992 to result in the availability of quantitative satellite-derived rainfall estimates for all of sub-Saharan Africa.

(b) Asia. UNDP provided valuable assistance to developing countries in Asia and the South Pacific region through national as well as regional projects. Satellite ground stations were installed in Mongolia, the Democratic People's Republic of Korea and Sri Lanka. Eighteen participants from 13 countries, in addition to participants from the host country, attended a three-week training workshop on satellite meteorology held at Beijing. A UNDP country programme in China is providing a modern satellite data archiving and retrieval system. Some Pacific island countries will be provided with DCPs with UNDP support.

(c) Americas. As part of a project of the Finnish International Development Agency (FINNIDA), satellite communications are planned to be used for the CEMET (Central American meteorological telecommunications network) circuits in Central America. In Colombia, 25 DCPs are being installed in the Magdalena-Canoa basin for hydrological forecasting purposes using NOAA geostationary environmental satellites (GOES).

140. ECA, in cooperation with WMO and other United Nations agencies, will offer advisory services to member States in developing institutional capabilities utilizing remote-sensing data from meteorological satellites.

3. Dissemination of information on the status of technology

141. The application of satellite technology is particularly important in activities carried out under the Tropical Cyclone Programme (TCP) to mitigate disasters caused by tropical cyclones. The Eleventh WMO Congress (Geneva, May 1991) noted with satisfaction the very important role played by meteorological satellites in the operational warning systems, particularly in the detection and monitoring of tropical cyclones. TCP aims at improving the capability of national meteorological and hydrological services to provide

forecasts and timely warnings of violent winds, torrential rainfall, floods, storm surges and landslides/landslips caused by tropical cyclones. These activities are based on the WWW and operational hydrology programmes of WMO, which take into account the remote-sensing and data transmission capabilities of satellites.

142. Within the framework of the WMO plan of action for the International Decade for Natural Disaster Reduction, a special project on a tropical cyclone warning system for the south-west Indian Ocean region has been established to upgrade substantially the tropical cyclone warning system in the south-west Indian Ocean region through the applications of meteorological satellite and microcomputer technology and the transfer of scientific knowledge.

143. Considerable efforts continue to be undertaken within WMO to provide information on developments in the International Maritime Satellite Organization (INMARSAT) and to promote its application among WMO members, as well as to assist its members in adapting their marine observations and services systems to meet the new and changing requirements. WMO also collaborated with Collection and Location Satellite (CLS)/Service Argos for the collection of data from remote, unmanned ocean platforms.

144. The use of data collection capabilities on geosynchronous meteorological satellites is growing rapidly. Of particular importance is the use of the International Data Collection System, where the main emphasis is on obtaining data from above ocean areas. Two systems, carried on board a ship and aircraft to collect high-quality aerological data through meteorological satellites, have been developed for use in WWW. Implementation began in 1988 and will continue for several years. The use of data dissemination capabilities on geosynchronous meteorological satellites is also developing. The Meteorological Data Distribution Service provided via Meteosat will dramatically improve the reception of meteorological information, particularly in Africa. A similar service is being planned on the geostationary meterological satellite (GMS) operated by Japan.

145. The overall long-term goals of the WMO/ICSU World Climate Research Programme (WCRP) are to determine to what extent climate can be predicted and the extent of man's influence on climate (see A/AC.105/389, para. 84, and A/AC.105/444 and Corr.1, para. 115). These goals are being implemented as follows:

(a) The scientific plan for WCRP gives high priority to understanding the effects of cloudiness on the radiation energy budget (see A/AC.105/373, para. 68, and A/AC.105/444 and Corr.1, para. 115 (a)). The International Satellite Cloud Climatology Project (ISCCP), established in July 1983, aimed at the establishment of a five-year global radiance and cloud data set based on observations from the international array of geostationary meteorological satellites and operational polar-orbiting satellites. The project has been extended through June 1995;

(b) Two major observational programmes are involved within WCRP: the study of the inter-annual variability of the tropical ocean and the global atmosphere (TOGA), 1985-1995 (see A/AC.105/342, para. 88 (b), and A/AC.105/444 and Corr.1, para. 115 (b)) and the World Ocean Circulation Experiment (WOCE), 1990-1995 (see A/AC.105/309, para. 104, and A/AC.105/444 and Corr.1, para. 115 (b)). The decision of France and the United States to proceed with the implementation of the joint Typhoon Operational Experiment (TOPEX)/Poseidon altimetric mission in mid-1992 and the preparation of the European oceanographic satellite mission, ERS-1, are of particular importance for the success of WOCE;

(c) In addition to ISCCP, WCRP has initiated projects to produce monthly fields of sea surface temperature and precipitation; these projects require substantial amounts of satellite observations;

(d) WCRP is preparing a Global Energy and Water Cycle Experiment (GEWEX), planned for 1995-2000, based on the multinational Earth Observing System (EOS), to obtain information on atmospheric thermodynamics, global water transport and land surface processes not available through the existing operational systems. A major international component of the experiment will be the GEWEX Continental-scale International Project (GCIP), which will permit the systematic testing of models over catchment areas of a major river basin for a minimum of five years. The project will rely on upgraded operational data systems and require integrated aircraft and satellite observations.

146. Within its training publications programme, WMO updated publication No. 240, Compendium of Training Facilities for Meteorological and Operational Hydrology (see A/AC.105/465, para. 129).

147. UNEP, as an Earthwatch activity through GEMS, will strengthen its cooperation with WMO and other agencies on activities relating to the Global Climate Observing System (GCOS). The goals of GCOS are to develop climate system monitoring, especially of terrestrial ecosystems, and to acquire data for applications to national economic development and for research towards improved understanding, modelling and prediction of the climate system; and eventually to produce a comprehensive observation system for climate forecasting. Some of the data are derived from satellite sensors.

148. UNEP and WMO, as part of their ongoing close cooperation on the issue of climate change, as well as WMO itself, through its Global Ozone Observing System (GO_3OS), monitor stratospheric ozone for use in assessments of ozone layer modifications resulting from changes in abundances of chlorofluorocarbons (CFCs) and other ozone depleting substances. The information obtained by WMO through satellite monitoring activities contributes significantly both to GEMS and to the activities of the assessment panels established by the Ozone Secretariat, which is responsible for implementing the decisions of the parties to the 1987 Montreal Protocol.

149. Climate monitoring activities within the world climate data programme involve satellite data covering sea ice, snow cover, solar radiation, aerosol

optical depth, albedo and clouds (see A/AC.105/359, para. 80). WMO's climate data information referral system (INFOCLIMA) includes information on some available satellite data sets needed for climate monitoring and research. The world climate applications programme continues to investigate and promote the development of potential uses of satellite data in climate applications. WMO recently established the major climate change detection projects that widely use satellite data.

150. A new Global Atmosphere Watch (GAW) system was established as an early warning system to detect changes in the greenhouse gases, including ozone, and pollutants. Ground observations made in the background air pollution monitoring network (BAPMoN) will continue to provide information required to verify future satellite-based observations of some atmospheric constituents. The Global Ozone Observing System (GO_3OS), guided and coordinated by WMO, will measure atmospheric ozone through more than 150 ground-based stations, supplemented by a few satellite observation systems. All the above activities contribute to Earthwatch by providing data to GEMS.

151. The WMO Commission for Atmospheric Sciences (CAS) continues to rely on the use of satellite data for research, for both climate studies and weather analysis and prediction of all time scales. The CAS working groups, especially those on climate research and weather prediction research, coordinate their activities related to satellite data utilization for research with the Executive Council Panel of Experts on Satellites and other bodies concerned. The WMO Programme on Short- and Medium-range Weather Prediction Research will study the application of high-resolution quantitative satellite data.

152. Based on the structure of WMO's hydrology and water resources programme, a number of projects relating to hydrological networks and instrumentation, hydrological forecasting methods and systems and the application of remote-sensing techniques to operational hydrology are being undertaken. The results of much of this work will be available at the end of 1992. During the same year the WMO Commission for Hydrology at its ninth session will establish its work plan for 1993-1996 period. Based on the third long-term plan of WMO approved by the XIth Congress, this will include satellite activities relying on data for hydrological purposes collected or transmitted by satellites.

153. The WMO Commission for Marine Meteorology (CMM) and the Joint IOC/WMO Working Committee for IGOSS maintain a close interest in the use of satellites for both ocean measurement and communications. A CMM/IGOSS group of experts is preparing a consolidated report on the use of oceanographic satellite programmes and the use of data for operational applications. A joint WMO/IOC Technical Conference on operational ocean remote sensing is being planned for August/September 1993.

154. The joint rapporteurs of the WMO Commission for Agricultural Meteorology (CAgM) have prepared a report on developments in operational remote sensing for application to agriculture. The report will be considered by CAgM at its tenth session for further activities in the field.

155. WMO and representatives of ICSU, IOC and other international organizations and representatives of contributing space agencies are discussing a Global Climate Observing System (GCOS). Conceived at the Second World Climate Conference and discussed at the Eleventh World Meteorological Congress, GCOS is envisaged to develop in an evolutionary way to provide a bridge from the current array of operational systems and research observing programmes to a better coordinated and more effective combination of efforts of agencies with active programmes for observing the global environment. In this manifestation, GCOS, in the case of atmospheric analyses, would depend on existing and upgraded WMO WWW global observing systems and further development of GAW for the oceans would look to current scientific ocean observing programmes to develop a global ocean observing system. An additional goal would be to integrate and improve existing national and regional observing networks as well as global data collection and analysis activities including WCRP's global plotting chart, WMO's Global Runoff Data Centre (GRDC) and the International Geosphere-Biosphere Programme (IGBP) plan to map on a global scale the properties of terrestrial vegetation and ecosystems from remote-sensing data.

156. The development of scientific and technical requirements and preparation of recommendations for implementation of GCOS must necessarily involve national and multinational agencies which have programmatic and resource responsibility for undertaking large Earth observation activities. Recognizing this reality and building on its experience with the coordination Group for Meteorological Satellites (GCMS), WMO, primarily through the efforts of its satellite activities, is establishing close working relationships with other international satellite coordinating groups including the Committee on Earth Observations Satellites (CEOS) and the International Polar-Orbiting Meteorological Satellite Group (IPOMS).

157. WMO publications are listed in A/AC.105/444, and Corr.1, paragraph 125.

158. UNESCO will continue to publish, within the framework of the International Hydrological Programme, technical reports on new developments concerning the application of remote sensing of water resources.

159. In collaboration with WMO, UNESCO will initiate a pilot study in South America on a climatic-water resources-environmental model and information system. The study is envisaged to contribute directly to WCP, particularly WCRP and GEWEX, and to IGBP. It will provide facilities to South American countries for water resources and environmental impact assessment studies.

160. UNEP, as an Earthwatch activity, through GEMS, together with the WMO World Climate Programme, COSPAR and the International Association of Meteorology and Atmospheric Physics, will continue to support the International Satellite Land-surface Climatology Project (ISLSCP). ISLSCP plans to conduct field experiments to develop and validate determination of land surface properties and processes; to develop continental and global data sets of derived land surface parameters for use in biospheric and climate modelling; and to develop global models with interactive biosphere

and atmosphere components, monitoring critical regions subject to anthropogenic and other changes. ISLSCP, as an Earthwatch activity through GEMS, is developing a programme for studying forest ecosystems using satellite and ground measurements. Initiated by NASA and the Canada Centre for Remote Sensing, the programme is an important step of a field mission within the ISLSCP experiment.

161. ITU CCIR Study Group 7 will continue to study questions relating to the meteorological-satellite service and associated technologies through the next study period, 1990-1994.

D. BASIC SPACE SCIENCE

162. The United Nations Workshop on Basic Space Science for the Economic Commission for the Latin America and Caribbean (ECLAC) region will be held in March 1992.

163. A United Nations/ECA workshop on basic space research is scheduled to take place in 1993.

164. Through the United Nations Programme on Space Applications, the Government of the USSR is offering six nominal fellowships in the following disciplines: S. P. Korolev Fellowship Awards (two) for studies in scientific instrument manufacturing; Ya. B. Zeldovich Fellowship Awards (two) for studies in theoretical and experimental physics; M. V. Keldish Fellowship Award (one) for studies in systems and methods of space information processing; and K. E. Tsiolkovsky Fellowship Award (one) for research in the uses of space technology for the study of the Earth's rotation and the movement of the lithosphere plates. These fellowships are being offered at the postgraduate level for the benefit of developing countries and will each be of a duration of three years.

165. The UNESCO physics programme plans to cooperate with the International Astronomical Union (IAU) in an International Symposium on Adverse Environmental Impacts on Astromomy to be held at UNESCO headquarters in 1992. The Symposium will bring together about 30 leading astronomers from all fields of astronomy, 30 science journalists and about 40 government representatives for a review of research in various areas of astronomy and a detailed explanation on how man-made electromagnetic and other pollutants impede or even render impossible astronomical observations. A book based on the contributions and the discussions at the Symposium is planned.

E. LAND, MARITIME AND AERONAUTICAL MOBILE SERVICES

166. Following the 1988 IMO Maritime Safety Conference, the International Convention for the Safety of Life at Sea (SOLAS) amendments should enter into force on 1 February 1992. The Global Maritime Distress and Safety System (GMDSS) will be introduced in stages between 1992 and 1999. Satellite communications form a major part of GMDSS, and ships are being encouraged to install satellite equipment. The organization is also continuing the preparation of a master plan of shore-based facilities for GMDSS.

167. The further development of GMDSS to provide for its orderly introduction will be continued by IMO in close cooperation with ITU/CCIR, WMO, the International Hydrographic Organization, INMARSAT and the system for search-and-rescue operations (COSPAS-SARSAT).

168. The WHO Regional Office for Europe will continue to test a disaster management work programme from public health aspects. For disaster management, the programme will undertake research and development activities in a few countries to assess the feasibility and efficiency of using the INMARSAT services TT-3020A Standard-C Satellite Transceiver for receiving and communicating information on disasters for prompt and appropriate response. The services were tried out at the time of the earthquake in the Armenian SSR on 7 December 1988, and in Turkey in November 1990.

169. IMO has undertaken studies on a world-wide radio navigation system and adopted a policy for recognition and acceptance of such systems (IMO resolution A.666 (16)). On the basis of that policy, amendments to the 1974 SOLAS Convention will be considered when IMO is satisfied that a suitable radio-navigation system meeting its requirements is operational.

170. IMO, in close cooperation with the International Hydrographic Bureau, is also undertaking a study for a world-wide system of transmission and electronic display of nautical information on board ship, including means of updating the electronic navigation chart, which will be broadcast through the INMARSAT enhanced group and safety-net system. Equipment based on a provisional performance standard is being developed and tested.

171. ITU-CCIR Study Group 8 (mobile services), and particularly its Working Party 8 D, will continue to deal with technical and operating characteristics necessary for compatibility, inter-operability and the required performance levels for systems in the mobile satellite services.

172. Through the ICAO implementation of FANS, two air traffic service providers, the Union of Soviet Socialist Republics and the United States, agreed to implement the Global Orbital Navigation Satellite System (GLONASS) and the Global Positioning System (GPS), GLONASS to become operational not later than 1995 and GPS, in 1992 (see A/AC.105/444 and Corr.1, para. 139).

F. OTHER ACTIVITIES IN THE FIELD OF SPACE SCIENCE AND TECHNOLOGY AND ITS APPLICATIONS

173. The United Nations plans to issue at a future date a United Nations directory on publications and literature with particular emphasis on remote sensing and photogrammetry, in collaboration with the International Society of Photogrammetry and Remote Sensing.

174. The United Nations/Indonesia Regional Conference on Space Technology for Sustainable Development is scheduled to be held in 1992.

175. The United Nations/UNESCO/WMO/International Centre for Theoretical Physics (ICTP) Conference on "Bridging the Information Gap in Space Science and Technology" will be held at United Nations Headquarters, New York, in 1992.

176. The United Nations/ECA Africa Space Conference: Addressing African Management Needs, will take place in 1993.

177. The Legal Subcommittee of the Committee on the Peaceful Uses of Outer Space will continue in 1992, subject to the decision of the General Assembly, to elaborate draft principles relevant to the use of nuclear-power sources in outer space and to consider the legal aspects related to the application of the principle that the exploration and utilization of outer space should be carried out for the benefit and in the interests of all States, taking into particular account the needs of developing countries.

G. INTERNATIONAL SPACE YEAR ACTIVITIES

178. The United Nations and its specialized agencies will continue to collaborate on preparations for the International Space Year (ISY) activities. This is in conformity with General Assembly resolution 44/46 of 8 December 1989, by which the Assembly endorsed the initiative of international scientific organizations and bodies to designate 1992 as International Space Year and the recommendations of the Committee on the Peaceful Uses of Outer Space (see A/AC.105/465, para. 154).

179. The scope of United Nations ISY activities focuses on three major areas: (i) management of the resources of the Earth and its environment; (ii) long-term education programmes; and (iii) public education. It is hoped that these activities would provide encouragement to all countries, particularly the developing countries, not only to participate in the applications of space technology, but also to undertake programmes that could contribute to the understanding, management and the safeguarding of the global environment, to the solution of local and transnational environmental problems and to the development of the technology to meet local needs. ISY also offers the United Nations and the international community a unique opportunity to achieve major progress in the implementation of the recommendations of the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE 82).

180. The specific activities include, but are not limited to, the organization of a number of workshops, conferences, training courses and projects dealing with the management of the coastal/marine environment; essay contests for high school students at the national level on the theme "My vision of outer space and the promise it holds for my country and mankind"; monthly lectures and exhibitions at United Nations Headquarters in New York; a telecast on the theme of ISY; the establishment of centres for space science and technology education; collection and distribution of literature on space science and technology; and publication and distribution of booklets on (1) "Mission to Planet Earth", (2) space education and (3) recommendations to concerned Member States to establish universariums at the national level in order to encourage and stimulate interest in science among young students and in the general public.

181. As an affiliate member of the Space Agency Forum for International Space Year (SAFISY), UNESCO will make a special effort to strengthen programmes related to outer space during ISY. The United Nations and UNESCO are co-sponsoring major ISY conferences such as the European International Conference on Space in the Service of the Changing Earth (April 1992, Munich, Germany) and the World Space Congress (August 1992, Washington).

182. WHO will continue its efforts to develop and strengthen communications systems in support of primary health care by promoting the exchange of information and experiences and recommending effective communication policies.

183. As mentioned above, the United Nations is planning a world-wide telecast in 1992 as part of ISY activities which would coincide with the United Nations Conference on Environment and Development to be held in Brazil and with the World Space Congress to be held in Washington. The telecast would include a panel discussion by renowned experts on the subject of "Mission to Planet Earth". The panel members would also address the relevance of the programmes beyond ISY, including the importance of the participation of the developing countries.

184. The International Telecommunications Satellite Organization (INTELSAT) and the International Organization of Space Communications (INTERSPUTNIK) are prepared to provide a free space segment for the above telecast and would request their signatories to provide for the necessary ground segments, also free of charge. The United Nations will invite interested bodies of the United Nations system to co-sponsor the telecast and to participate in developing the substance of the programme and in structuring the telecast.

185. The 1992 United Nations/UNESCO/WMO/ICTP Conference on "Bridging the Information Gap in Space Science and Technology" (see para. 175 above) will also constitute a significant collaborative effort of the United Nations and the specialized agencies in ISY activities.